

REMARKS

Claims 1, 3 and 5-24 are pending in the present application.

Applicants' Response to the Claim Rejections under 35 U.S.C. §102

Claims 1, 20, 21 and 23 stand rejected under 35 U.S.C. 102(b) as being anticipated by **Otani et al.** (EP 1176231). Applicants respectfully traverse on the basis that there is no clear teaching of the limitations of claims 1, 20 and 23 that the diboride single crystal substrate has an orientation flat exhibiting a (10-10) or (11-20) plane and has a thickness of 0.1 mm or less.

Under U.S. patent law a claim is anticipated by a reference only if each and every limitation is taught in substantially the same manner by the reference. In the current case, **Otani** does not teach the orientation flat exhibiting a (10-10) or (11-20) plane and a substrate thickness of 0.1 mm or less.

In regard to the orientation flat exhibiting a 10-10 or 11-20 plane, the Office Action points to the disclosure in **Otani** at paragraph [0029]. This paragraph discloses a (11-20) crystal plane orientation. However, this disclosure is referring to the optimal planes "to grow the semi-conducting nitride layer." Hence, **Otani** is teaching that the (11-20) crystal plane is an alternative facial orientation to the (0001) orientation.

Contrary, the present invention is facially oriented in a (0001) plane with a perpendicular side surface exhibiting a (10-10) or (11-20) plane. As illustrated in Figs. 1(a) and 1(b) and disclosed in paragraphs [0031] to [0034] of the present application, the XB₂ single crystal substrate is constituted by a principal surface having a (0001) crystallographic plane 2 with a cut side surface in (10-10) plane 4. See also Fig. 4 and paragraph [0046].

Otani does not teach this limitation. Further this limitation would not be inherent to the substrate of **Otani** because there is no teaching that the diboride single crystal has a thickness of 0.1 mm or less.

The Office Action maintains that **Otani** discloses the required thickness of the present invention at paragraph [0008]. However, this paragraph is discussing prior art characteristics of a sapphire substrate. Specifically, the lattice constant of sapphire is excessively larger than that of GaN and AlN and a buffer layer is therefore required. There is no identifiable teaching that a diboride single crystal is formed with a thickness of 0.1 mm or less. Paragraph [0046] of **Otani** describes ZrB_2 and TiB_2 crystals being formed to have a length of 9 to 16 mm along a direction perpendicular to axis $\langle 0001 \rangle$.

Contrary, the present inventors have discovered that making a XB_2 single crystal substrate 0.1 mm or less in thickness permits the XB_2 substrate to be divided along a (10-10) plane of a nitride compound semiconductor to allow for ease in formation and due linearity. Reducing the thickness to 0.1 mm or less allows the diboride single crystal to be cut with its cut surface made parallel to (10-10) plane 4. This provides a favorable cut surface in terms of reducing the difficulty in cutting and provides the (10-10) plane rather than a (10-11) plane. Hence the (10-10) plane 4 of the XB_2 substrate is congruent with (10-10) in which a cleavage surface of a nitride compound semiconductor lies. See paragraphs [0033] to [0039] and [0044].

There is no teaching in **Otani** of reducing the thickness of the XB_2 substrate to 0.1 mm or less. Hence, this limitation of claims 1 and 23 is not anticipated.

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In view of the accompanying remarks, Applicants submit that the claims, as previously presented, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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